The Effectiveness of Early Childhood Home Visitation in Preventing Violence

A Systematic Review

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Overview

In early childhood home visitation programs, parents and children are visited at home during the child's first 2 years of life by trained personnel who provide some combination of information, support, or training about child health, development, and care. Home visitation has been used to meet a wide range of objectives, including improvement of the home environment, family development, and the prevention of child behavior problems. The Task Force on Community Preventive Services (the Task Force) has conducted a systematic review of scientific evidence of the effectiveness of early childhood home visitation for preventing violence, with a focus on violence by and against juveniles. The Task Force recommends early childhood home visitation for preventing child abuse and neglect, on the basis of strong evidence of effectiveness. The Task Force found insufficient evidence to determine the effectiveness of early childhood home visitation in preventing violence by visited children, violence by visited parents (other than child abuse and neglect), or intimate partner violence in visited families. This report gives additional information about the findings, including diverse outcome measures and results in study population subsamples, describes how the reviews were conducted, provides information that can help in applying the intervention locally, and recommends additional research.

Introduction

Early childhood home visitation has been used to address a wide range of public health goals for both visited children and their parents, including not only violence reduction but also other health outcomes, as well as health-related outcomes such as educational achievement, problem-solving skills, and greater access to resources.[1,2]

In our review, "home visitation" is defined as a program that includes visitation of parent(s) and child(ren) in their home by trained personnel who convey information about child health, development, and care; offer support; provide training; or deliver any combination of these services. Visits must occur during at least part of the child's first 2 years of life, but can begin during pregnancy and can continue after the child's second birthday. We allowed for programs in which participation in home visitation programs was either voluntary or mandated (e.g., by a court), but found no program in which participation was mandated. Visitors can be nurses, social workers, other professionals, paraprofessionals, or community peers.

In the United States, home visitation programs have generally been offered to specific population groups, such as low income; minority; young; less educated; first-time mothers; substance abusers; children at risk of abuse or neglect; and low birth weight, premature, disabled, or developmentally compromised infants. (Home visitation programs are common in Europe and are most often universal [i.e., made available to all childbearing families, regardless of estimated risk of child-related health or social problems]).[3] Visitation programs are often "two generational,"[4] addressing problems and introducing interventions of mutual benefit to parents and children. Programs may include (but are not limited to) one or more of the following components: training of parent(s) on prenatal and infant care; training on parenting to prevent child abuse and neglect; developmental interaction with infants and toddlers; family planning assistance; development of problem-solving and life skills; educational and work opportunities; and linkage with community services. Home visitation programs may be accompanied by the provision of day care; parent group meetings for support, instruction, or both; advocacy; transportation;

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and other services. When such services are provided in addition to home visitation, we refer to the program as "multicomponent."

Several theoretical orientations indicate the potential beneficial effects of home visitation on violence and other outcomes.[5,6] Human ecology theory[7] clarifies the importance of the social environment—including not only the influence of parents, but also of social networks, neighborhoods, communities, and cultures—in child development. Evidence shows that an environment of community disorganization and poverty can be a source of crime and violence.[8] Home visitation is seen as strengthening the capacities of parents in successfully relating to their social environment and gaining access to social resources. Because the effects of parenting are critical in the development and prevention of child violence,[8] home visitors also teach effective parenting and work to strengthen the support of family members and friends.

Enhancing parents' sense of self-efficacy also strengthens their capacities as parents. The underlying theory of self-efficacy is that people are more likely to act when they believe both that they are capable of carrying out a given action and that this action will accomplish a desired goal.[9] Home visitors may contribute here by encouraging and facilitating successful, achievable modifications in parents' lives, possibly including steps toward career development. Increased occupational independence may provide not only needed resources, but a sense of accomplishment and relief from stresses that distract from child care. Self-efficacy may also improve family planning and child spacing, thereby reducing maltreatment, which is more likely with greater numbers of children and children close to one another in age.[10] Finally, attachment theory[11,12] stresses the importance of a close relationship with parents for healthy child development; home visitors can play a role in strengthening attachment by giving guidance on effective parenting. Home visitors may work to modify harmful patterns of relationship that were learned in the parents' own upbringing.[13] Strong parental involvement can protect against the development of child violence.[8]

The purpose of this review is to assess the effectiveness of home visitation programs in preventing violence. Therefore, we reviewed studies of home visitation only if they assessed violent outcomes. We reviewed studies whether or not violence was the primary target or outcome of the visitation, as long as the study qualified by specified inclusion criteria (see "Search for Evidence" section) and assessed violent outcomes. The effects on other outcomes were not systematically assessed, but are selectively reported if addressed in the studies reviewed. We reviewed studies examining any of four violent outcomes:

1. Violence by the visited child, against self or others, including violence in school, delinquency, crime, or other observed or reported violent behavior
2. Violence by the visited parent, other than child maltreatment
3. Intimate partner violence
4. Violence against the child, specifically maltreatment (which includes all forms of child abuse and neglect)

Violence in which juveniles are offenders, victims, or both is a substantial problem in the United States. Over the last 25 years, juveniles have been involved as offenders in at least 25% of serious violent victimizations.[10] Since at least 1976, the highest rates of homicide in the United States have occurred among people aged 18 to 24 years.[10] In 1994, 33% of juvenile homicide victims were killed by a juvenile offender. Rates of homicide victimization among youth aged <15 years are five times higher in the United States than they are in the combination of other industrialized nations and regions for which data are available (Australia, Austria, Belgium, Canada, Denmark, England and Wales, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Kuwait, Netherlands, New Zealand, Northern Ireland, Norway, Scotland, Singapore, Sweden, Spain, Switzerland, and Taiwan). Rates of firearm-related homicide are approximately 16 times higher in the United States than in those same nations.[14] Rates of suicide also rise substantially during adolescence, reach a plateau among people aged 35 to 44 years, and rise substantially again only after age 65 years.[15] The rate of suicide among children aged <15 years in the United States is twice that of the combination of industrialized nations noted above.[14]

Although intimate partner violence victimizes men as well as women in the United States, women are three times more likely to be victims than are men.[16] During her lifetime, one out of four women in the United States will be the victim of partner violence: 7.7% will be victims of rape and 22.1% will be victims of other physical assaults.[16] Violent victimization of women, including threats of rape and sexual assault, is greatest among women aged 16 to 19 years. Such violence can have severe physical and mental consequences for victims.[17]

In 1999, 4.1% of children (aged <18) were reported to be victims of maltreatment. Many of those reports (33.8%) are investigated and not confirmed by child protective services. Further complicating this picture, national survey data indicate that additional cases of maltreatment are not reported.[10,18,19] Child maltreatment can include physical, sexual, or emotional abuse; physical, emotional, or educational neglect; or any combination of these. Not only is child maltreatment a form of violence in and of itself, but it is associated with

adverse consequences among maltreated children, such as early pregnancy, drug abuse, school failure, mental illness, and suicidal behavior.[20,21] Although the relationship is not well understood, children who have been physically abused are more likely to perpetrate aggressive behavior and violence later in their lives, even after accounting for other risk factors for violent behavior.[22] Abuse and neglect are both associated with poverty and single-parent households; for reasons such as these, many home visitation programs in the United States are directed to poorer, minority, and single-parent families.

The Guide to Community Preventive Services

The systematic reviews in this report represent the work of the independent, nonfederal Task Force on Community Preventive Services (the Task Force). The Task Force is developing the *Guide to Community Preventive Services* (the *Community Guide*) with the support of the U.S. Department of Health and Human Services in collaboration with public and private partners. The Centers for Disease Control and Prevention (CDC) provide staff support to the Task Force for development of the *Community Guide*. A special supplement to the *American Journal of Preventive Medicine*, "Introducing the Guide to Community Preventive Services: Methods, First Recommendations and Expert Commentary," published in January 2000,[23] presents the background and the methods used in developing the *Community Guide*. This review of the effectiveness of home visitation on the prevention of violence is one of a series of *Community Guide* reviews on the prevention of violence that focus on violence by and against juveniles.

Healthy People 2010 Goals and Objectives

The intervention reviewed here may be useful in reaching several objectives specified in *Healthy People 2010*,[24] the disease prevention and health promotion agenda for the United States. These objectives identify some of the significant preventable threats to health and focus the efforts of public health systems, legislators, and law enforcement officials for addressing those threats. Many of the proposed *Healthy People* objectives in Chapter 15, "Injury and Violence Prevention," relate to the home visitation intervention and its proposed effects on violence-related outcomes. Violence-specific objectives that might be related to home visitation are listed in Table 1. (It should be noted, however, that home visitation can affect other outcomes not directly related to violence prevention. As noted, these outcomes are not systematically reviewed here, and the corresponding goals and objectives are not included in Table 1.)

Table 1. Selected *Healthy People 2010*[a] objectives related to home visitation programs

Injury prevention
Reduce hospitalization for nonfatal head injuries from 60.6 to 45.0 per 100,000 population[b] (Objective 15-1).
Reduce hospitalization for nonfatal spinal cord injuries from 4.5 to 2.4 per 100,000 population[a] (Objective 15-2).
Reduce nonfatal poisonings from 348.4 to 292 per 100,000 population[c] (Objective 15-7).
Reduce deaths caused by poisoning from 6.8 to 1.5 per 100,000 population[b] (Objective 15-8).
Reduce deaths caused by suffocation from 4.1 to 3.0 per 100,000 population[b] (Objective 15-9).
Reduce hospital emergency department visits from 131 to 126 per 1000 population[c] (Objective 15-12). See query 2.
Unintentional injury prevention
Reduce deaths caused by unintentional injuries from 35.0 to 17.5 per 100,000 population[b] (Objective 15-13).
(Developmental) Reduce nonfatal unintentional injuries (Objective 15-14).
Reduce drownings from 1.6 to 0.9 per 100,000 population[b] (Objective 15-29).
Violence and abuse prevention
Reduce homicides from 6.5 to 3.0 per 100,000 population[b] (Objective 15-32).
Reduce maltreatment of children from 12.9 (in 1998) to 10.3 per 1000 children aged <18 years (Objective 15-33a).[d]
Reduce child maltreatment fatalities from 1.6 (in 1998) to 1.4 per 100,000 children aged <18 years (Objective 15-33b).[d]
Reduce the rate of physical assault by current or former intimate partners from 4.4 (in 1998) to 3.3 per 1000 persons aged ≥12 years (Objective 15-34).
Reduce the annual rate of rape or attempted rape from 0.8 (in 1998) to 0.7 per 1000 persons aged ≥12 years (Objective 15-35).
Reduce sexual assault other than rape from 0.6 (in 1998) to 0.4 per 1000 persons aged ≥12 years (Objective 15-36).
Reduce physical assaults from 31.1 to 13.6 per 1000 persons aged ≥12 years (Objective 15-37).
Reduce physical fighting among adolescents from 36% to 32% (baseline students in grades 9 through 12, fighting during the previous 12 months in 1999) (Objective 15-38).

[a]U.S. Department of Health and Human Services.[24]
[b]Baseline: 1998 data, age adjusted to year 2000 standard population.
[c]Baseline: 1997 data, age adjusted to year 2000 standard population.
[d]Note that Objective 15-33a is per 1000 children aged <18 years, whereas Objective 15-33b is per 100,000 children aged <18 years. Comparable objectives would be reduction of child maltreatment to 1290 per 100,000 children aged <18 years and reduction of child maltreatment fatalities to 1.6 per 100,000.

Information from Other Advisory Groups

In 1991, the U.S. Advisory Board on Child Abuse and Neglect, created by Congress, recommended universal home visitation to address maltreatment in the United States,[25] but its recommendation was not accepted by the U.S. Department of Health and Human Services or implemented by Congress.

Other reviews have found home visitation effective for preventing youth violence. The recent report titled *Youth Violence* by the Surgeon General,[26] using several measures of violent outcomes, concludes that nurse home visitation "has shown significant long-term effects on violence, delinquency, and related risk factors in a number of studies."

The Center for the Study and Prevention of Violence recommends nurse home visitation for preventing child abuse and neglect and child violence, among other benefits. It cites the program designed by Olds et al.[27] as a model "blueprint" program that meets its highest standards of evidence in terms of experimental design, substantial effect, replication, and sustainability.

The Office of Justice Program's review, *Preventing Crime: What Works, What Doesn't, What's Promising*,[28] also gives a high rating to early home visitation by nurses, other professionals, and trained paraprofessionals for preventing crime and its risk factors. The CDC cites the home visitation approach among the best practices for preventing youth violence.[29] Similarly, Developmental Research and Programs, Inc. cites several early home visitation programs[30] (including the nurse home visitation program by Olds et al.[31] and the Syracuse Family Development Research Program[6]) among its recommended preventive strategies.

Finally, the Canadian Task Force on Preventive Health Care recommends early childhood home visitation programs for preventing child maltreatment in disadvantaged families.[32] It notes that the strongest evidence exists for the nurse-delivered programs (as used in the program by Olds et al.[27,31]) that start before the child is born and continue for 2 years after birth.

Conceptual Approach and Analytic Framework

The general methods for conducting systematic reviews for the *Community Guide* have been described in detail elsewhere.[33–37] This section briefly describes the conceptual approach and determination of outcomes considered in assessing the effects of home visitation on violence.

The conceptual model (or analytic framework) used to evaluate the effectiveness of home visitation in reducing violence (Figure 1) shows the relationship of the intervention to the intermediate outcomes (i.e., the influences on parental resources, parenting behavior, and child development) and finally to the violent outcomes. In this model, we note four broad violent outcome categories (violence by child, violence by parent, intimate partner violence, child maltreatment), all of which were considered in our review.

Unfortunately, no studies of home visitation report age-specific effects for either violence by parents or intimate partner violence against parents. Thus, we reviewed study results for parental violence without regard to age, noting that a substantial proportion of visited parents were themselves adolescents at the time of home visitation program delivery.

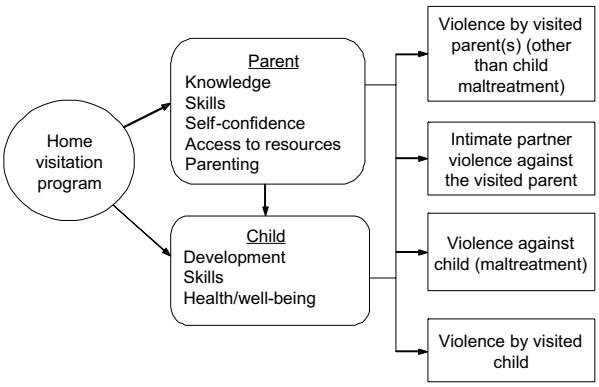

Figure 1. Analytic framework for early childhood home visitation. Circle represents the intervention itself; rectangles with rounded corners show intermediate outcomes; and rectangles with square corners show health-related outcomes.

Methods

In the *Community Guide*, evidence is summarized on (1) the effectiveness of interventions; (2) the applicability of evidence data (i.e., the extent to which available effectiveness data might apply to diverse population segments and settings); (3) positive or negative effects of the intervention beyond those assessed for the purpose of determining effectiveness, including positive or negative health and nonhealth outcomes; (4) economic impact; and (5) barriers to implementation of interventions. When evidence is insufficient to determine the effectiveness of the intervention on a specific outcome, information about applicability, economics, or barriers to implementation is not included, unless there is an issue of particular interest.

The process used to review evidence systematically and translate that evidence into the conclusions reached in this article involved:

Forming a systematic review development team and a team of consultants (see acknowledgments at the end of this article)
Developing a conceptual approach to organizing, grouping, and selecting interventions
Selecting interventions to evaluate
Searching for and retrieving evidence
Assessing the quality of and abstracting information from each study
Assessing the quality of and drawing conclusions about the body of evidence of effectiveness
Translating the evidence of effectiveness into recommendations
Considering data on applicability, other effects, economic impact, and barriers to implementation
Identifying and summarizing research gaps

This section summarizes how these methods were used in developing the reviews of home visitation interventions. The reviews were produced by the systematic review development

team and a multidisciplinary team of specialists and consultants representing a variety of perspectives on violence.

Search for Evidence

Electronic searches for literature were conducted in Medline, EMBASE, ERIC, NTIS (National Technical Information Service), PsycINFO, Sociological Abstracts, NCJRS (National Criminal Justice Reference Service), and CINAHL. We also reviewed the references listed in all retrieved articles, and consulted with experts on the systematic review development team and elsewhere. We used journal papers, government reports, books, and book chapters. The initial literature search on the topic was conducted in August 2000 and a second (update) search was conducted in July 2001.

Articles were considered for inclusion in the systematic review if they had the following characteristics:

Evaluated the specified intervention.
Published before July 2001.
Assessed at least one of the violent outcomes specified.
Conducted in an established market economy.[a]
Primary study rather than, for example, a guideline or review.
Compared a group of people who had been exposed to the intervention with a group of people who had not been exposed or who had been less exposed. (The comparisons could be concurrent or in the same group over time.)

The four outcomes evaluated to determine the effect of the intervention were violence by the child, violence by the parent, intimate partner violence, and child maltreatment (abuse and neglect). Specific measures accepted as direct or proxy measures of these outcomes are listed in the "Results" section. If both direct and proxy measures were available, preference was given to the direct measure. The four outcomes reviewed are referred to as "recommendation outcomes," because, if evidence is sufficient, they provide the basis for recommending the intervention (i.e., we accepted these as either representing improved health or as proxies for improved health outcomes).

Abstraction and Evaluation of Studies

Each study that met the inclusion criteria was read by two reviewers who used a standardized abstraction form to record information from the study.[37] Any disagreements between the reviewers were reconciled by consensus among the development team members. In addition, to ensure a consistent application of both assessments of study design suitability and limitations in execution quality within the body of evidence, every evaluated study was presented and discussed in meetings of the systematic review development team.

[a]Established market economies as defined by the World Bank include Andorra, Australia, Austria, Belgium, Bermuda, Canada, Channel Islands, Denmark, Faeroe Islands, Finland, France, Germany, Gibraltar, Greece, Greenland, Holy See, Iceland, Ireland, Isle of Man, Italy, Japan, Liechtenstein, Luxembourg, Monaco, the Netherlands, New Zealand, Norway, Portugal, San Marino, Spain, St. Pierre and Miquelon, Sweden, Switzerland, the United Kingdom, and the United States.

Assessing the Suitability of Study Design

Each study that met the inclusion criteria was evaluated by using a standardized abstraction form (available at *www.thecommunityguide.org/methods/abstractionform.pdf*) and was assessed for suitability of the study design and threats to validity.[33] On the basis of the number of threats to validity, studies were characterized as having good, fair, or limited execution.[33,37] Studies with good or fair quality of execution and any level of design suitability were included in the body of evidence. Our study design classifications, chosen to ensure consistency in the review process, sometimes differ from the classification or nomenclature used in the original studies.

Assessing the Quality and Summarizing the Body of Evidence on Effectiveness

The quality of study execution was systematically assessed using *Community Guide* methods.[33] Several studies had separate intervention "arms," that is, two or more interventions that were compared with each other or a control; each arm was assessed separately. Unless otherwise noted, we represented the results of each study arm as a point estimate of the relative change in the violent outcome rate associated with the intervention. We calculated percent point changes (absolute percent change) and baselines using the following formulas:

For studies with before-and-after measurements and concurrent comparison groups:

$$\text{Effect size} = (\text{Ipost}/\text{Ipre})\ /(\text{Cpost}/\text{Cpre}) - 1$$

where

Ipost = last reported outcome rate in the intervention group after the intervention
Ipre = reported outcome rate in the intervention group before the intervention
Cpost = last reported outcome rate in the comparison group after the intervention
Cpre = reported outcome rate in the comparison group before the intervention

For studies with post measurements only and concurrent comparison groups:

$$\text{Effect size} = (\text{Ipost} - \text{Cpost})/\text{Cpost}$$

For studies with before-and-after measurements but no concurrent comparison:

$$\text{Effect size} = (\text{Ipost} - \text{Ipre})/\text{Ipre}$$

We report the effect of the intervention as beneficial or desirable when the intervention was associated with a decrease in a violent outcome examined, and as harmful or undesirable when the intervention was associated with an increase in the violent outcome. We use the median and interquartile range to report effect sizes from multiple studies. We also note whether zero was included within the upper and lower interquartile range. Interquartile ranges including zero suggest that the results are inconsistent in direction; interquartile ranges not including zero suggest that the results are consistent in direction.

In some cases, we had to select among several possible effect measures for our summary measures of effectiveness. When available, we included measures adjusted for potential

confounders in multivariate analysis rather than crude effect measures. No studies were excluded from the evaluation strictly on the basis of an insufficient follow-up period. If the intervention program had multiple evaluations at different follow-up points, we chose the evaluation at the longest follow-up period with an attrition rate of <30%. In the analysis of study findings, we used the standard two-tailed p value cut-off at the 0.05 level as a measure of statistical significance.

We summarized the strength of the body of evidence on the basis of the number of available studies, the strength of their design and execution, and the size and consistency of reported effects, as described in detail elsewhere.[33] In brief, by *Community Guide* standards, single studies of greatest design suitability and good execution can provide sufficient evidence of effectiveness if the effect size is itself considered sufficient; single studies are generally considered sufficient only if the effect measure is statistically significant ($p < 0.05$). Three studies of at least moderate design suitability and fair execution, or five studies with at least fair execution, can provide sufficient evidence of effectiveness if the findings are consistent in direction and size and if the effect size is itself considered sufficient (i.e., of public health importance). Statistical significance is considered principally when there is only one study of greatest suitability and good execution. When the number of studies and their design and execution quality are sufficient, by *Community Guide* standards, to draw a conclusion on effectiveness, the results are summarized both graphically and statistically.

It is critical to note that when we conclude that evidence is insufficient to determine the effectiveness of the intervention on a given outcome, we mean that we do not yet know what effect, if any, the intervention has on that outcome. We do not mean that the intervention has no effect on the outcome.

Summarizing Applicability

The body of evidence used to assess effectiveness was also used to assess applicability, the generalizability of effectiveness findings to populations with differing characteristics. The systematic review development team and the Task Force drew conclusions about the applicability of the available literature to various populations and circumstances.

Other Effects

As noted, the *Community Guide* review of home visitation did not systematically assess the effects of this intervention on other outcomes (e.g., on mother–infant attachment, physical and cognitive development, school achievement, substance abuse, or other behavior problems). However, we mention some of the benefits noted in the studies that we have reviewed. We also note the potential harms of the home visitation intervention if they were mentioned in the effectiveness literature or were thought to be of importance by the systematic review development team.

Economic Evaluations

Economic evaluations of interventions were conducted only if there was sufficient or strong evidence of effectiveness. Methods used in economic evaluations are described elsewhere.[35,36]

Summarizing Barriers to Implementation of Interventions

Barriers to implementation were summarized only if there was sufficient or strong evidence of effectiveness of the intervention.

Summarizing Research Gaps

Systematic reviews in the *Community Guide* identify existing information on which to base public health decisions about implementing interventions. An important additional benefit of these reviews is identification of areas in which information is lacking or of poor quality. To summarize these deficits, remaining research questions for each intervention evaluated are identified. Where evidence of effectiveness of an intervention is sufficient or strong, remaining questions about effectiveness, applicability, other effects, economic consequences, and barriers are summarized. Where evidence is insufficient to determine effectiveness of an intervention, remaining questions are summarized only about effectiveness and other effects, but not about applicability, economic consequences, or barriers.

Results: Part I—Intervention Effectiveness and Economic Efficiency

Evidence Reviews: Violence by Child

We reviewed the evidence concerning the violent behavior of children who were home-visited early in their lives. Although the prevention of youth suicide (i.e., violence against self) is a plausible outcome of home visitation, we found no study that assessed this outcome. Direct measures for violence by child were reported and observed violence, and violent crime; proxy measures were arrests, convictions, or delinquency as ascertained from official records (all for behavior that might or might not include violence), externalizing behavior (behavior in which psychological problems are acted out), and conduct disorder (in which "the basic rights of others or major age-appropriate societal norms or rules are violated").[38] Studies were included in the body of evidence only if they reported at least one of these effect measures.

Effectiveness. Our search identified four studies[6,31,39,40] that reported the effects of home visitation programs on violence by the visited children. Descriptive information about execution quality, design suitability, and outcomes evaluated in these studies is provided in Appendix A. Two studies[31,39] were of good quality of execution, and two studies[6,40] were of fair quality. All four studies were of highest design suitability.

One study[31] of nurse home visitation in Elmira NY examined criminal and delinquency outcomes in 15-year-olds who were visited by nurses prenatally through the first 2 years of their lives. The systematic review development team chose self-reported delinquency

(i.e., "major delinquent acts")[b] as the principal outcome in this study because it referred to self-reported behavior, unaffected by the social processes of arrest or conviction. Three of the items included as "major delinquent acts" are explicitly violent, and the remaining items have violent connotations (i.e., the threat of violence or the violation of property and its owners). The study reported a nonsignificant increase (of 18.2%) in self-reported major delinquent acts in the intervention group compared with the control group. The study also reported a statistically significant decrease in self-reported arrests (58.2%) and convictions (63.0%), and nonsignificant decrease (33.3%) in arrests of subjects reported by subjects' mothers. Among the children of single mothers of low socioeconomic status (SES), home visitation was associated with a nonsignificant reduction in major delinquent acts and with significant reductions in self-reported arrests and convictions, as well as arrests reported by the child's mother.

Another study[6] of a multicomponent home visitation program in Syracuse NY assessed delinquent and violent outcomes when visited children had reached 13 to 16 years. Researchers reported a significantly lower (by 72.3%) proportion of subjects "processed as probation cases by the County Probation Department" in the intervention group compared with the control group (probation processing is an indicator of serious crime). A listing of offenses by all study subjects indicates that the offenses committed by comparison subjects were more serious than those committed by home-visited subjects. In addition, the study reported that 2 (out of 54) subjects in the control group committed violent crimes, whereas none of 65 subjects in the intervention group committed such crimes.

The other two studies[39,40] reported only externalizing behavior (from the Externalizing subscale of the Child Behavior Checklist[41]). One study[39] reported such follow-up results when the children were aged 9 years, and the other study[40] when children were aged 5 years. Both studies reported no significant differences between intervention and control groups in Externalizing subscale scores.

Conclusion. Although the number of studies is sufficient to draw a conclusion about the effectiveness of home visitation in preventing later violence by visited children, study findings are inconsistent. Two studies[39,40] found no significant differences in outcomes between intervention and control populations (but did not report results in a manner that allowed an assessment of the direction of the study findings), one study[6] found a beneficial effect, and one[31] had mixed results that included benefits as well as nonsignificant effects. Because the findings from these studies are mixed, the evidence is insufficient to determine the effectiveness of home visitation interventions in preventing child violence.

[b]"Major delinquent acts" were defined in the study as any of the following: hurt someone sufficiently that they needed bandages, stole something, trespassed, damaged property on purpose, hit someone because he or she said something objectionable, carried a weapon, set fire intentionally, or was in a fight with gang members.

Evidence Reviews: Violence by Parents

We reviewed the evidence on the effect of home visitation on the violent behavior of parents in the visited home (other than maltreatment, considered below). Direct measures for this outcome were reported and observed violence, and arrests or convictions for violent crime (from self-reports or official reports). Proxy measures were general arrests and convictions, which did not state whether violence was part of the crime. Studies were included in the body of evidence only if they reported at least one of these outcome measures.

Effectiveness. The 15-year follow-up to the Elmira study[42] (of highest design suitability and good execution quality) was the only study identified by our search that examined the effect of home visitation on parental violence. Many of the mothers (48% of the initial sample) were teenagers when home visitation was initiated.

This study reported statistically nonsignificant reductions in maternal arrests (59.1% by self-report and 68.4% by state records) and convictions (76.9% by self-report and 55.6% by state records) for mothers in the intervention group compared with mothers in the control group. In the subsample of mothers who were single and of low SES at the time of visitation, the study reported statistically significant reductions in maternal arrests (69.0% by self-report and 82.2% by state records) and convictions (78.6% by self-report and 81.2% by state records).

Conclusion. The one study of highest design suitability and good execution quality could be sufficient to allow assessment of the effectiveness of home visitation interventions in preventing parental violence (other than child maltreatment). However, because of the lack of statistically significant results for the total sample, the Task Force judged the evidence insufficient to determine the effectiveness of home visitation interventions in preventing parental violence. The finding of substantial (although not statistically significant) effects in the whole sample, and statistically significant effects in a subsample, are promising and deserve replication.

Evidence Reviews: Intimate Partner Violence

We reviewed the evidence on the effect of home visitation on violence involving the parents of visited children. Direct measures for this outcome category were reported and observed partner victimization, as

well as arrests and convictions for partner assault. No proxy measures were considered. Studies were included in the body of evidence only if they reported at least one of these outcome measures.

Effectiveness. The 15-year follow-up to the Elmira study[43] (of highest design suitability and good execution quality) was the only study identified by our search that examined the effect of home visitation on intimate partner violence. Descriptive information about the execution quality, design suitability, and outcome evaluated in this study is provided in Appendix A. Among a wide range of outcomes examined, the study included the incidence of domestic violence in the families of visited children over the 15-year follow-up period. No significant difference in the incidence of domestic violence between the intervention and control groups was found, and no effect size or direction of effect was reported.

Conclusion. Although the one study was characterized as having highest design suitability and good execution quality, its failure to find a statistically significant effect leads to a conclusion of insufficient evidence to determine the effectiveness of home visitation in preventing parental violence.

Evidence Reviews: Child Maltreatment

We reviewed evidence about the effects of home visitation on the subsequent maltreatment (abuse or neglect) of visited children. Direct measures for this outcome category were reports from child protective services, and abuse or neglect reported or observed by parents or others. Proxy measures for this category were emergency room visits or hospitalizations for injury or ingestion, reported injury, and out-of-home placement. Although these proxy outcomes may result from causes other than abuse or neglect, many are thought to result from these causes.[44] Studies were included in the body of evidence only if they reported at least one of these outcome measures. For other forms of child victimization, such as bullying, no qualifying studies were identified.

Effectiveness. We identified 22 studies (in 21 reports)[42,45–64] with 27 intervention arms. One study[45] (representing one intervention arm) was excluded from the review because of limited quality of execution. The remaining 21 studies (with 26 intervention arms) were included in the body of evidence for this review. One report[64] described two separate studies, one of which had two intervention arms. One study[62] had three intervention arms, and two studies[55,59] had two intervention arms each. Descriptive information about execution quality, design suitability, and outcomes evaluated in these studies is provided in Appendix A.

Twenty intervention arms assessed the effects of home visitation on abuse or neglect (reported by child protective services or by home visitors); five intervention arms assessed effects on rates of injury, trauma, or the ingestion of poison (from emergency room visits, medical or hospital records, or mothers' reports); and one intervention arm assessed out-of-home placement as an outcome (see Appendix A). Most studies assessed maltreatment, injury, or trauma at the conclusion of the intervention; 10 months was the shortest follow-up time, and 3 years the longest. Only one study[42] assessed abuse and neglect substantially beyond the conclusion of the intervention: 15 years after the intervention's initiation (i.e., when the children were aged 15 years).

Overall, summary effect measures were in the desired direction (i.e., the intervention group had a lower rate of undesirable outcomes—abuse or neglect, injury or trauma, or out-of-home placement—than the comparison group) in 19 of the 26 study arms in the body of evidence; effect measures in the remaining 7 intervention arms were not in the desired direction (i.e., the intervention group had a higher rate of undesirable outcomes). Overall, the median effect size was −38.9% (interquartile range, −74.1% to +24.0%). Results of analyses stratified by the type of the outcome measure (abuse or neglect, injury or trauma, or out-of-home placement) are presented in Table 2. The distribution of effect sizes stratified by outcome is presented in Figure 2.

Researchers[65] have noted that, because home visitors are legally required to report maltreatment, the presence of the home visitor increases the likelihood that violence (such as child maltreatment) will be observed. Thus, the presence of the visitor biases all of the studies against the hypothesis that visitation prevents maltreatment. Two studies in this review[47,50] allow the assessment of the magnitude of this bias because they report rates of maltreatment assessed among home-visited children by child protective services alone and by child protective services in conjunction with reports by the home visitor. In these two studies, the presence of the visitor seemed to increase the rate of reported maltreatment by 80%[47] and 150%,[50] respectively. We explored the implications of such a bias in a sensitivity analysis by adjusting results using a more conservative estimate (i.e., an increase of 50%) to assess the possible effects of this bias in the studies we reviewed. These adjusted results (for the abuse or neglect outcome only, adjusted on the assumption that home visitors would report 50% more maltreatment cases) are presented as a separate row in Table 2 ("Abuse/neglect adjusted"). As can be seen, after adjustment the median effect size for the abuse or neglect outcome changes from −39.6% to −59.7%, and the upper boundary of the interquartile range moves below zero. Although the exact magnitude of this bias is open to debate, overall the presence of this reporting bias would tend to strengthen the general conclusion that home visiting reduces child maltreatment.

Table 2. Summary analysis of studies measuring child maltreatment (abuse and neglect)

	Studies (*n*)	Negative (*n*)	Positive (*n*)	Median[a]	Interquartile range[a]		Range[a]	
					Lower	Upper	Lower	Upper
Total papers	21							
Total intervention arms	26	19	7	−38.9	−74.1	24	−100	228.4
By outcome								
Abuse/neglect	20	14	6	−39.6	−74.6	37.2	−100	228.4
Abuse/neglect (adjusted)[b]	20	17	3	−59.7	−83.1	−8.5	−100	118.9
Injury/ingestion/trauma	5	5	0	−31.9	−72.2	−10.8	−100	−2.9
Out-of-home placement	1	0	1	13.0	NA	NA	NA	NA
By visitor type								
Nurses	5	5	0	−48.7	−89.0	−24.6	−100	−2.9
Paraprofessionals	18	11	7	−17.7	−65.7	41.2	−100	228.4
Mental health workers	3	3	0	−44.5	NA	NA	−93.2	−18.7
By components								
Single component	17	13	4	−31.9	−55.9	5.5	−87.4	127.6
Multicomponent	9	6	3	−46.3	−96.6	35.1	−100	228.4
Randomization								
Randomized	18	13	5	−27.5	−46.9	19.6	−100	228.4
Nonrandomized	8	6	2	−68.3	−77.3	20.0	−93.2	94.1
By time of program initiation								
Prenatal	6	4	2	−23.7	−58.0	66.8	−93.2	228.4
Postnatal	16	11	5	−20.9	−59.5	37.2	−100	127.6
Both prenatal and postnatal	4	4	0	−74.3	NA	NA	NA	NA

[a]Percentage change, intervention group versus control (see Effectiveness section in Evidence Reviews: Child Maltreatment).
[b]Adjusted for detection bias (see text), by a factor of 1.5.
NA, not available or not applicable.

We found that professional visitors (i.e., nurses and mental health workers) produced more beneficial results than paraprofessionals (Table 2). (Most studies simply reported using "paraprofessional" visitors without defining the term; we assumed paraprofessionals to be trained for the visiting program, but to lack formal or professional training in subjects relevant to visitation, such as health care, mental health, or family counseling.)

In further analyses, we also found strong negative correlation (Spearman rho=−0.52; $p=0.01$) between the observed effect size and the planned duration of the program (i.e., longer programs tended to show more beneficial results). (Information on the actual or mean number of home visits made was not available in a sufficient number of studies reviewed to allow analysis; thus we analyzed only intended number or duration of visits.) The correlation was particularly strong when we considered only the programs delivered by paraprofessionals (Spearman rho=−0.63; $p<0.01$). For paraprofessional visitors, effects are mixed, and beneficial effects are found only in programs of longer duration (i.e., two years or longer). We found few studies of nurse visitation programs with a duration of <2 years. Figure 3 shows the distribution of study effect sizes depending on program duration and the type of visitor.

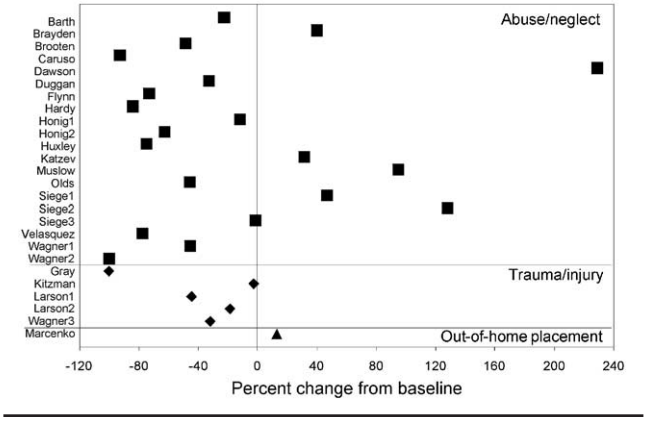

Figure 2. Distribution of effect sizes stratified by outcome.

The other stratified analyses that we performed did not show any substantial or consistent differences across strata (Table 2). Studies in these analyses were stratified by method of subjects' assignment to treatment conditions (randomized vs nonrandomized), the time of program initiation (prenatal vs postnatal vs either), and program components (single-component [i.e., home visitation only] vs multicomponent [i.e., involving some additional services, such as child care, pediatric care, free transportation, or parent support groups]). Available studies did not provide enough information to determine whether effectiveness of home visitation differs for first-time mothers versus mothers with previous live births.

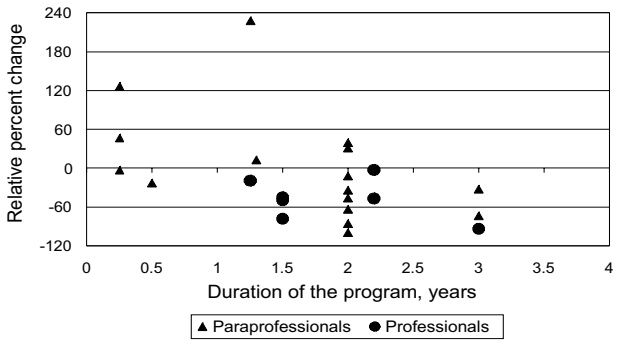

Figure 3. Home visitation effects by duration of program. Spearman correlation: whole sample: −0.52 (p =0.01); paraprofessionals: −0.63 (p <0.01); professionals: −0.32 (not significant).

Applicability. The same body of evidence was used to evaluate the applicability of home visitation programs in different settings and populations. All studies were conducted in the continental United States and Hawaii, except for one in Canada (Montreal).[59] The vast majority of programs targeted those populations and families believed to benefit most from components offered by many of the programs reviewed (e.g., support in parenting and life skills, prenatal care, and case management). Target populations included teenage parents; single mothers; families of low SES; families with very low birth-weight infants; parents previously investigated for child maltreatment; and parents with alcohol, drug, or mental health problems.

An analysis of the effects of the Elmira home visitation program on intimate partner violence[66] indicates an inverse relationship between the frequency of partner violence in a home and the effectiveness of home visitation programs, suggesting that partner violence may need to be addressed before home visitation programs can be effective in reducing violence directed against children in the home. No study reviewed assessed the effectiveness of universal home visitation in the prevention of violence.

Other positive or negative effects. Systematic analysis of the many other possible beneficial or harmful effects is beyond the scope of this review. We found examples of such effects in the best study to date, which also had the longest follow-up period (15 years).[31,42] That study[42] reported consistently beneficial, but statistically nonsignificant, effects for visited mothers, including a 19.0% decrease in number of subsequent pregnancies (a risk factor for child abuse),[10] a 19.9% decrease in months receiving Aid to Families with Dependent Children (AFDC), a 15.1% decrease in months receiving food stamps, a 7.5% increase in time employed, and a 20.9% decrease in problems related to illicit substance use. Results for these outcomes were statistically significant in the study subsample (40% of the total sample) that included only single, low SES mothers.

Consequences other than violence for the visited children at 15-year follow-up[31] were less clear. For example, this study found decreases in the incidence of drug use (12.3%), in the number of sexual partners (25.6%), and in the number of long-term school suspensions (75%). At the same time it reported increases in the incidence of alcohol use (19.1%) and in the proportion of subjects who ever had sex (20.0%) in the intervention group compared with the control group. Among the children of low SES single mothers, home visitation was generally associated with desired results, including a significant reduction in the number of sex partners; nonsignificant reductions in the use of drugs, alcohol, and cigarettes; an increase in the number of short-term suspensions; but a decrease in the number of long-term suspensions.

Other possible beneficial effects of the home visitation programs reviewed that are mentioned in the literature include improved socioemotional and physical development of the visited children; better immunization coverage; better access to, and use of, medical care; improved family planning; improved home environment; and a higher level of education and professional achievement attained by the parents.[1,2] However, assessment of these other outcomes is beyond the scope of the present review.

It has been suggested that negative effects of home visitation (especially when targeted to high-risk groups) may include stigmatization of the target group (e.g., single mothers, minority, poor), but we found no studies of this issue.[28,42]

Economic efficiency. Our search identified one economic evaluation of a home visitation intervention to reduce child abuse and neglect. This study[65] was carried out in a semirural county in upstate New York. The study evaluated the net benefits of a nurse home visitation program provided to first-time mothers. Of the mothers in the study, 61% were of low SES and 24% were either unmarried or aged <19 years. Home visits by a registered nurse began before the child was born and lasted until the child reached age 2 years. The visits began on a weekly basis; by 20 months postdelivery, visits were made every 6 weeks. Program content included parent education, the strengthening of family support (by encouraging other family members and friends to become involved in the home visit and in child care), and the linking of families with other health and human services. Goals included improvement of the child's health, reduction of child abuse, and improvement of the mother's own life course.

The cost-benefit analysis[c] of this intervention was limited to government costs and benefits, not those of

[c]Cost–benefit analysis is an evaluation technique that standardizes, in dollar terms, both the costs and benefits accrued in a given time period. Results are typically reported as a single value (e.g., net benefits [total benefit minus total cost]).

program participants, the healthcare system, or society at large. Program costs considered were through the child's second birthday, and included nurse salaries and fringe benefits; nurse training; part-time secretary; part-time supervisor; taxicab; linked services such as the Women, Infants, and Children (WIC) nutritional supplementation program; supplies; and overhead. The benefits considered were through the child's fourth birthday, and included reduced use of government services (i.e., AFDC, child protective services, food stamps, and Medicaid), and newly generated tax revenues from mothers returning to work.

Authors reported results for the subsample of low-income mothers as well as for the whole sample. For the low-income subsample, government benefits more than offset program costs, for a net benefit to government of $350.61 per low-income family (adjusted to 1997 dollars). Including benefits attributable only to reduced need for child maltreatment services (3% of total benefits) was not enough to offset program costs in the low-income subsample (i.e., costs exceeded benefits). For the whole sample, government costs exceeded benefits, which resulted in a net benefit of −$3081 per family (adjusted to 1997 dollars). Benefits attributable to reduced child maltreatment were not specified for the whole sample. Including benefits beyond those of the government, such as averted healthcare costs, productivity losses, and other possible monetary and nonmonetary benefits[67] associated with reduced child maltreatment, or any longer-term benefits, would likely result in greater net benefits.

The study was classified as satisfactory, based on the quality assessment criteria used in the *Community Guide*.[35] The economic summary table for the study is provided at the website (*www.thecommunityguide.org*).[36]

For the above program, adjusted nurse visitation direct costs—including salaries, fringe benefits, part-time supervisor and secretary, overhead, travel, and supplies—were estimated to be $6286 per family in 1997 dollars over the 2-year intervention period. In a 1998 follow-up investigation,[27] program costs were re-estimated to be $7000 per family (in 1997 dollars). This estimate was based on the original study design, but was calculated to serve 100 families with four full-time nurse specialists, each taking on ≤25 cases. In addition to the full-time nurses, the new estimate includes a part-time secretary and nurse supervisor; comprehensive office and program materials, including cell phones; liability insurance; medical supplies; general staff development; and mileage. In most cases, training and technical assistance, including a computer and network fees, would also be necessary at program outset (but were not included in the base case analysis). Such startup costs were estimated to increase program costs to $8000 per family during the first 3 years of the program.

Another study[48] with less-intensive and less-frequent intervention (i.e., five visits over 18 months) was conducted at the Hospital of the University of Pennsylvania in Philadelphia. Early discharge and home visitation were only carried out if the infant's physical condition and environment met specified criteria (e.g., clinically well, stable maintenance of body temperature, and adequate home care facilities), and if parental consent was given. Program costs of nurse home visitation for very low birth-weight infants that had been discharged early were estimated and included pre- and post-discharge nurse time, telephone, and travel expenses. As in the other study reporting economic characteristics, the population studied here was also of lower SES and most mothers were single. The effect of the program, compared with a nonvisited control group, was also similar to that of the other study, that is, −48.7% versus −46.3%, both close to the median of the studies reviewed. Average program costs (adjusted to 1997 dollars) were estimated to be $958 per family. Infants included in the study were born between October 1982 and December 1984 and received postdischarge follow-up care by either a full-time or part-time specialist with a master's degree in nursing. Predischarge visits established a relationship between the nurse and parents to facilitate training and information exchange to prevent abuse and neglect. Postdischarge visits provided further instruction and assessment of both infant and parent well-being. Nurses also contacted the parents by telephone during the first 8 weeks postdischarge and were on call to address immediate concerns. The large difference between this program cost estimate and that provided by Olds et al.[31,42] is most likely due to program duration and frequency of visits as well as additional program costs included in the estimate.

Barriers to intervention implementation. Barriers to implementing home visitation interventions frequently discussed in the literature include difficulties in the retention of study participants[68] and program staff.[2,65] Home interventions have generally been targeted to families of low SES, who are in challenging life circumstances with few resources. It is understandable, therefore, that such families might be overwhelmed with other problems and might lack sustained interest in or ability to commit to regular home visitation; they might also be hard to reach and retain in the program because of frequent life transitions.[69,70] Home visiting personnel (especially when paraprofessional lay visitors are used) may be hard to recruit, train, and retain due to low pay and difficult work conditions. It has also been noted that paraprofessional visitors may require more training and supervision than professionals (e.g., nurses).[71]

Conclusion. According to *Community Guide* rules of evidence,[33] available studies provide strong evidence that early childhood home visitation programs are effective in preventing child maltreatment, reducing

reported maltreatment by approximately 39%. Programs delivered by professional visitors (nurses or mental health workers) seem to yield greater effects than those delivered by paraprofessionals. For paraprofessional visitors, effects are mixed, and beneficial effects are generally found in programs of longer duration (i.e., ≥2 years).

Results: Part II—Research Issues

Strong evidence indicates that early home visitation is effective in preventing child maltreatment in low SES, single mother, and other families that have been targeted by such programs. Currently available evidence is insufficient to determine the effectiveness of early home visitation in preventing violence by visited children or visited parents (i.e., violence other than child maltreatment), or in preventing intimate partner violence in visited families. For all four outcomes reviewed, we identified key research issues in several areas that have not been answered or merit further research.

Effectiveness

Although we have demonstrated the effectiveness of home visitation in the prevention of child maltreatment, evidence on the other outcomes assessed (violence by children, violence by parents, and intimate partner violence) was insufficient to determine effectiveness. Further research on the effectiveness of home visitation in the prevention of these outcomes would clarify other possible benefits of this intervention. Findings of large, but statistically nonsignificant, effect sizes for some of these outcomes suggest that studies may be of low statistical power; we believe that larger sample sizes should be considered. Suicidal behavior by visited children and diverse forms of victimization should also be assessed as outcomes in home visitation programs. Follow-up studies should determine long-term as well as short-term effects.

The evidence we reviewed indicates a benefit of home visitation for the reduction of child maltreatment in populations that have been shown to be at elevated risk of maltreatment. The population that might benefit is a large one. In 1999, 33% of the 3.6 million births in the United States were to single mothers, 12% were to teen mothers, and 22% were to mothers with less than a high school education[72]; 43% of births—approximately 1.7 million—were to mothers with at least one of these characteristics (B. Hamilton, National Center for Health Statistics, personal communication, September 9, 2002). Given such a large need, it will be useful to conduct research, perhaps in the form of demonstration projects, to make the intervention more effective. Because the visitation programs reviewed are heterogeneous and differ in content, organization, personnel, intensity, and other characteristics, questions that should be addressed include:

What number, spacing, and duration of home visits is optimal for cost-effective programs that are acceptable to visited families?
What training for professional and paraprofessional home visitors maximizes cost-effectiveness?
What circumstances enhance the effectiveness of paraprofessional visitors (e.g., educational background and origin)?
How should the curriculum of home visits be organized, in terms of structure, and specific components and contents?
How strong is the need for program fidelity (i.e., degree of adherence to initially proposed curriculum and schedule) for the reduction of violent behaviors?
What is the utility of additional components, such as parent support groups, child daycare, enhanced pediatric care, free transportation to appointments, and linkage with social support services?
What are the essential components of home visitation programs, and what components are dispensable?
What populations are most likely to benefit from home visitation programs and what program characteristics are most important for specific populations?

Studies of some of these issues are under way.[73]

Applicability

The effectiveness of home visitation for child maltreatment prevention has been demonstrated in a variety of geographic areas and "at-risk" populations. Although we found insufficient evidence to determine the effectiveness of home visitation on child violence, parental violence, and other outcomes among both visited children and parents, evidence from the Elmira study indicated beneficial effects for these outcomes among visited low SES households with single parents. It is still unclear whether other specific subgroups (e.g., racial/ethnic populations) within the general category of "population at-risk" are likely to benefit more than other subgroups.

Studies of the effectiveness of home visitation in preventing violence by visited children have examined diverse populations, but too few studies are available, and they provide inconsistent evidence. Evidence about parental violence outcomes is limited to a mostly white population from the northeastern United States, principally from the study by Olds et al.[31,42] If found to be effective, the applicability of early home visitation for these outcomes in different populations should also be determined. In addition, it will be useful to determine if home visitation is effective in the general population (as well as in "at-risk" populations), and if so, if benefits exceed costs.

Other Positive or Negative Effects

As noted, this review did not systematically summarize evidence of the effectiveness of home visitation programs on nonviolent outcomes. Such outcomes might include children's cognitive, emotional, and physical development; school achievement; substance use; sexual activity; access to health care; immunization coverage; quality and safety of the home environment; employment of parents; educational achievement of parents; and family planning, including spacing and number of subsequent pregnancies.

We are hopeful that the research questions that we have just developed for home visiting and violence might also inform additional studies or reviews of home visiting to achieve other outcomes as well.

Concerning negative effects, questions that should be addressed include:

How serious is the problem of stigmatization by risk criteria when home visitation programs are directed at "at-risk" populations?
If stigmatization is an important problem (under some or all circumstances), what can be done in program design to minimize the negative effects of stigmatization?
What role can community coalitions play in preventing or alleviating stigmatization?

Economic Evaluations

The available economic evidence was limited. Considerable research is warranted on the following questions:

What is the cost and cost effectiveness of the various alternative home visitation programs?
How can effectiveness in terms of health outcomes or quality-adjusted health outcomes be better measured, estimated, or modeled?
How can the cost benefit of this program be estimated from a societal perspective?
How do specific characteristics of this approach contribute to economic efficiency?

Barriers

Several important barriers may adversely affect implementation and outcomes of home visitation programs. Addressing the following research questions may help to avoid or overcome these barriers:

What program components or design features improve the retention of program participants?
Can baseline characteristics of families that are more likely to drop out of home visitation programs be identified? Might such identification improve efforts to retain participants in the programs?
What design characteristics of home visitation programs improve the work satisfaction and retention of home visitors?
What background characteristics of visitors and required pre-program training minimize visitor dropout and maximize program performance?
What features of service systems are essential for efficient implementation and sustainability of home visitation programs?
What is the minimum level of services infrastructure needed to support adequate supervision of lay home visitors?
What combination of community characteristics provides optimal community readiness for implementation and sustainability of home visitation programs?

Discussion

This review addresses the effects of early childhood home visitation on child maltreatment and other violent outcomes. Substantial positive effects have been found for the prevention of child maltreatment—a median relative reduction of 39%. This effect estimate is most likely an underestimate, given that ascertainment of violence in the intervention group may actually be increased by the presence of the visitors. The intervention may also change long-term violent behaviors by visited children and their parents, but the evidence related to those outcomes is not yet sufficient to draw conclusions or make recommendations. Many other possible benefits may result from early home visitations (as discussed above), and they all should be assessed when determining the ultimate cost-benefit balance of such interventions.

The impressive beneficial effect despite the heterogeneity of home visitation programs in the United States—which often differ in their focus, curricula, duration, visitor qualifications, and target populations—suggests the robustness of the home visitation intervention. It also raises the question of whether there is one optimal, effective, and cost-effective approach for the multiplicity of possible outcomes. The greater improvements found in our review for programs using professional visitors (vs paraprofessionals) and for programs of longer duration are only a start in answering a long list of research questions related to finding the best approaches for early childhood home visitation.

Our findings and recommendations are similar to those of some government and not-for-profit agencies, but differ from findings and recommendations of others. The Canadian Task Force on Preventive Health Care[32] and the Center for the Study and Prevention of Violence (CSPV)[27] recommend home visitation for the prevention of child abuse in disadvantaged families, as does the *Community Guide*. Other agencies, including the CDC's National Center for Injury Prevention and Control[29]; U.S. Surgeon General's report, *Youth Violence*[26]; the report prepared for the U.S. Department of

Justice's Office of Justice Programs, *Preventing Crime: What Works, What Doesn't, What's Promising*[28]; and the CSPV all recommend home visitation for the prevention of youth violence, delinquency, or crime. We have not found sufficient evidence on which to base such a recommendation. Differences in recommendations are the result of differing scope and methods of assessment. The Surgeon General's Report draws on the findings of CSPV, CDC, *Preventing Crime*, and other reviews. The CDC best practice recommendations are largely based on the assessments of specialists in the field. The CSPV focuses on a single model program[13] with optimal evaluation design and replication. *Preventing Crime* uses standards similar to ours, but assesses home visitation programs for children aged >2, as well as programs focused on the first 2 years, and considers outcomes that are not direct measures of violence (e.g., cognitive development). In addition, our review covers 4 more years of research.

Although home visitation is widespread among European nations (where these programs are usually delivered to all population groups), we found no studies evaluating violent outcomes in European programs. Given that all of the evaluations we assessed examined programs directed at high-risk populations, a question remains: Should home visitation efforts be directed only to such populations, or might home visitation be beneficial, and economically justified, for populations at higher socioeconomic and educational levels? The answer to this question may lie with benefits of home visitation beyond the benefits of violence reduction assessed in this review.

In conclusion, this review, along with the accompanying recommendations from the Task Force on Community Preventive Services,[74] should prove a useful and powerful tool for public health policymakers, program planners and implementers, and researchers. It can help to secure resources and commitment for implementing home visitation interventions, and can provide direction for further empirical research in this area.

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Appendix A

Table A1. Studies measuring effect of home visitation on preventing violence

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
Violence by child						
Achenbach (1993)[1] Highest: prospective with comparison Good	Burlington VT Recruitment in 1980–1981 Mean age of mothers: 25–29 yr; ethnicity not reported; only low-birth weight infants (birth weight: <2250g)	Four visits: at 3, 14, 30, and 90 days after discharge; initiated post-birth Neonatal nurse	Seven 1-hour sessions by neonatal nurse in maternity hospital, before discharge	All eligible Randomized into low-birth weight intervention and low-birth weight control groups I: n=24 C: n=31	Externalizing scale of Child Behavior Checklist (at age 9 years) No significant difference between low-birth weight intervention and low-birth weight control groups	No significant difference
Lally (1988)[2] Highest: prospective with comparison Fair	Syracuse NY Recruitment in 1969–1971 "Majority black" families; mean age of mothers: 18 yr, income <$5000 yr; 85% unmarried	Visits: one/wk; initiated in the 3rd trimester of pregnancy, continued until child's 5th birthday Paraprofessional	Free child care 50 wk/yr, for 5 yr (including transportation) Parent support groups	Probably convenience (not described) Matched controls recruited when intervention group children were age 3 yr I: n=65 C: n=54	Number of subjects processed as probation cases by the county probation department, assessed when children were 13 to 16 years of age (proportion of sample) Intervention group: 4 (6%) Control group: 12 (22%) (p=0.01)	−72.3% (p=0.01)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
Olds (1998)[3] Highest: prospective with comparison Good	Elmira NY Recruitment 1978–1980 88% white; 11% black; 62% unmarried; 59% low SES; 48% aged <19 yr	Visits: one/wk, then less frequently, initiated before 29th wk of gestation, through child's 2nd birthday Nurses	Both intervention and control groups received free transportation to prenatal and well-child care and developmental screening	All eligible Randomized I: n=97 C: n=148	All outcomes assessed when children were aged 15 yr Major delinquent acts per subject (self-report): Intervention group: 3.57 Control group: 3.02 (NS) Incidence of arrests (self-report): Intervention group: 0.17 Control group: 0.36 (p<0.01) Incidence of convictions and probation violations (self-report): Intervention group: 0.10 Control group: 0.27 (p<0.01) Incidence of arrests (mother report): Intervention group: 0.08 Control group: 0.12 (p<0.01)	Major delinquent acts: +18.2% (NS) Arrests (self-report): −52.8% (p<0.01) Convictions (self-report): −63.0% (p<0.01) Arrests (mother report): −33.3%

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
St. Pierre (1999)[4] Highest: prospective with comparison Fair	USA, 21 sites Probably 1992–1995 35% of mothers aged <20 yr, 43% black, 26% Hispanic, 26% white, 3% Native American, 1% Asian; 83% with income <$10,000/yr	Two to four visits/mo; 5 yr Paraprofessionals		Probably convenience (not described) Not random I: *n*=1507 C: *n*=1544	Externalizing scale of Child Behavior Checklist (at age 5 yr) No significant difference between low-birth weight intervention and low-birth weight control groups	No significant difference
Child maltreatment						
Barth (1991)[5] Highest: prospective with comparison Good	California Probably 1984–1988 45% white, 31% Hispanic, 17% black, 7% other, 40% received AFDC, 70% income <$10,000; mean age 23.5 yr; screened as "at risk" for child abuse	About one every 2 wk, for 6 mo; mean 11 visits (5–20), initiated post-birth Paraprofessionals		Convenience (referrals) Randomized I: *n*=97 C: *n*=94	Substantiated child abuse reports, before and after the program (at program completion) Intervention group: 5 (before) and 15 (after) Control group 1 (before) and 14 (after)	−23.1% (NS)
Brayden (1993)[6] Highest prospective with comparison Fair	Tennessee Probably 1984–1989 Mean age ~22 yr; 70% white; all below 200% of poverty level; screened as "at risk" for child abuse	Frequency not reported; 0–2 yr, initiated post-birth Probably paraprofessionals (not clearly stated)	Pediatric care Psychological support counseling	All eligible Randomized I: *n*=141 C: *n*=122	Substantiated physical abuse reports as proportion of the sample (at program completion) Intervention group: 9.2% Control group: 6.6%	+39.5% (NS)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
Brooten (1986)[7] Highest: prospective with comparison Good	Pennsylvania 1982–1986 ~80% black, 20% white; ~2/3 income <$10,000; only very-low-birthweight infants	Five visits from birth to 18 mo, initiated post-birth Nurses	On-call nurse availability	All eligible Randomized I: *n*=39 C: *n*=40	Reported cases of child abuse (at 18 mo) Intervention group: 2 Control group: 4	−48.7% (NS)
Caruso Whitney (1997)[8] Highest: prospective with comparison Fair	Florida Probably 1977–1986 Over 80% black, 6%–7% white; 7%–12% Hispanic; low SES; 75% unmarried	First yr: 1/wk, 2nd yr: 1 every 2 wks, 3rd yr: usually 1/mo; initiated in the 3rd trimester of pregnancy, continued until age 3 yr Mental health workers	Parent support groups, child activity groups	Presumably all eligible Nonrandom I: *n*=171 C: *n*=91	Reports of abuse or neglect resulting in removal from home (at 12–18 mo), proportion of the sample Intervention group: 0.53% Control group: 7.79%	−93.2% (NS)
Dawson (1989)[9] Highest: prospective with comparison Fair	Colorado 1977–1979 74% White, 25% Hispanic; low SES	Median number of completed home visits: 30, initiated at 30th wk of pregnancy, continued until age 14 mo Paraprofessionals (community mothers)	Pediatric care Parent support groups once in 2 weeks (only for half of intervention group)	Convenience Randomized I: *n*=67 C: *n*=44	Reports of potential child abuse or neglect Intervention group: 5 Control group: 1	+228.4% (NS)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention		Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
		Frequency and duration Visitor type	Other components (study arms, if any)			
Duggan (1999)[10] Highest: prospective with comparison Fair	Hawaii 1994–1998 20% native Hawaiian, 13% Pacific Islander, 19% Filipino, 12% Caucasian, 7%–10% Asian, rest multiracial or unknown; 2/3: below poverty level; screened as "at risk" for child abuse	Starts at one/wk, then less frequently; (mean number of visits: 13) from birth to age 2 years Paraprofessionals		Convenience Randomized I: n=329 C: n=238	Confirmed child abuse and neglect reports to Hawaii Child Protective Services (at 2 yr), proportion of the sample Intervention group: 2% Control group: 3%	−33.3% (NS)
Flynn (1999)[11] Lowest: post-intervention measure with no comparison (compared with national rate only) Fair	New Jersey 1995–1997 All mothers aged <19 yr; mean: 16.9 yr; 71% black, 27% Hispanic; screened as "at risk" for child abuse	Starts at one/wk, then one every 2 wks, one/mo, one every 3 mo; duration not specified, apparently about 2 yrs, initiation at birth or prenatally Paraprofessionals		Convenience No control I: n=137	Confirmed cases of child abuse and neglect Intervention group: four cases (rate 2.9%) (Compares with national rate by adolescent mothers of 11%)	−73.6% (NS)
Gray (1979)[12] Highest: prospective with comparison Fair	Colorado Probably 1971–1975 No information on race, economic status, or age; screened as "at risk" for child abuse	Visits one/wk; initiated after birth, duration unclear (evaluated at 17 mo) Nurses	Pediatric care	Random sample from all eligible Randomized I: n=50 C: n=50	Injury suspicious for abuse/neglect (at 17 mo) Intervention group: 0 Control group: 5	−100% (p<0.01)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
Hardy (1989)[13] Highest: prospective with comparison Fair	Baltimore MD Probably 1983–1987 All black, urban; 78% of mothers single	Visits every 2 to 3 mo; from birth until 2 yr, about 8 to 10 total Paraprofessionals		Presumably all eligible Randomized (odd-even) I: n=131 C: n=132	Suspected or confirmed cases of child abuse and neglect (proportion of sample), follow-up ≥10 mo (average 22 to 24 mo) Intervention group: 2 (1.5%) Control group: 13 (9.8%)	−84.7% (NS)
Honig (2001)[14] Highest: prospective with comparison Fair	Syracuse NY Study period not reported Mean age 17.5 yr (range 13 to 21); 95% receiving public assistance; race/ethnicity not reported; screened as "at risk" for child abuse	Visits one/wk; duration 18 to 27 mo; initiated prenatally (Arm A) or postnatally (Arm B) Presumably paraprofessionals		Convenience Not random (control groups formed from program dropouts) Arm A: I: n=52 C: n=13 Arm B: I: n=25 C: n=24	Child abuse reports, proportion of sample (apparently at exit, 18 to 27 mo) Arm A (pre-birth): Intervention group: 13.5% Control group: 15.4% Arm B (post-birth): Intervention group: 20% Control group: 54.2%	Arm A: −12.3% (NS) Arm B: −63.1% (p<0.05)
Huxley (1993)[15] Highest: prospective with comparison Fair	Boulder CO Probably 1987–1990 Mean age: 21 (I), 19 (C); ethnicity not reported; screened as "at risk" for child abuse	Frequency and duration not reported, evaluation at 12 mo Paraprofessionals, also public health nurses and mental health professionals		Convenience All eligible controls included, matched to cases I: n=20 C: n=20	Confirmed reports of child abuse (at 12 mo) Intervention group: 1 Control group: 5	−75.0% (p=0.07)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
Katzev (1999)[16] Highest: prospective with comparison Fair	Oregon 1996–1997 Mean age: 20.7 yr, 29% aged ≤17 yr; 74% white, 22% Hispanic screened as "at risk" for child abuse	Visits one/wk, then less frequently, presumably from birth to 2 yr Paraprofessionals	Parent support groups	Convenience Comparison with those who refused to participate I: n=1332 C: n=1372	Child abuse reports, proportion of sample Intervention group: 3.4% Control group: 2.6%	+30.8% (NS)
Kitzman (1997)[17] Highest: prospective with comparison Good	Memphis TN 1990–1993 92% black; 85% below poverty; mean age: 18 yr	Visits one/wk, then less frequently; initiated prenatally, 29 wk gestation to 2 yr; mean: 7 prenatal and 26 postnatal visits Nurses	Both intervention and control groups received free transportation to pediatric appointments and developmental screening	All eligible Randomized I: n=228 C: n=515	Incidence of emergency department visits for injury or ingestion (through age 2 yr) Intervention group: 0.33 Control group: 0.34	−2.9% (NS)
Larson (1980)[18] Highest: prospective with comparison Fair	Montreal, Canada Study period not reported White; "working class income" age: 18 to 35 yr	Visits one every 2 wk, then less frequently; duration 15 mo, initiated prenatally (Arm A) or 6 wk postnatally (Arm B), both groups received ten visits total Child psychologists		Convenience Randomized (both Arm A and Arm B compared with the same control group) I: (Arm A) n=26 I: (Arm B) n=27 C: n=37	Accident rate per child (at 18 mo) Arm A (pre-birth): Intervention group: 0.86 Arm B (post-birth): Intervention group: 1.26 Control group: 1.55	Arm A: −44.5% (p<0.01) Arm B: −18.7% (NS)
Marcenko (1996)[19] Highest: prospective with comparison Fair	Pennsylvania Study period not reported 93%–95% black; mean age ~24 yr; mean income $450 to $480 per mo; screened as "at risk" for out-of-home placement of a child	Visits one every 2 wk; initiated in 3rd to 6th mo of pregnancy, ended when child aged 1 yr Paraprofessionals		Presumably all eligible Randomized I: n=113 C: n=84	Out-of home placement (either in foster care or with relatives/friends) (measured at 16 mo), proportion of sample Intervention group: 26% Control group: 23%	+13.0% (NS)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
Mulsow (1996)[20] Highest: prospective with comparison Fair	Georgia 1993–1995 All black, teenage (13 to 20 yr), urban; 89% received some form of government support; screened as "at risk" for stressful conditions of parenting	Duration and frequency of visits not reported; initiated after birth Presumably paraprofessionals		Presumably all eligible Not random I: n=15 C: n=36	Reports of child abuse and neglect (both substantiated and nonsubstantiated) (at 2 yr) Intervention group: 5 (33%) Control group: 6 (17%)	+94.1% (p=0.18)
Olds (1997)[21] Highest: prospective with comparison Good	Elmira NY 1978–1982 88% white, 11% black; 62% unmarried; 59% low SES; 48% aged <19 yr	Visits one/wk, then less frequently; initiated before 29 wk of gestation, through child's 2nd birthday Nurses	Both intervention and control groups received free transportation to prenatal and well-child care and developmental screening	All eligible Randomized I: n=97 C: n=148	Substantiated reports of child abuse and neglect, incidence (birth to 15 yr) (reports per 15-yr follow-up period) Intervention group: 1.95 Control group: 3.47	−46.3% (p<0.01)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
Siegel (1980)[22] Highest: prospective with comparison Fair	Greensboro NC 1976–1978 About 25% white, race/ethnicity of remainder not reported; 65% single; mean age: 20–21 yr	Nine visits during first 3 mo of life Paraprofessionals	Arm A: Uncomplicated delivery, early mother–child contact (at least 45 minutes during first 3 hours after delivery), and home visitation Arm B: Uncomplicated delivery and home visitation (no early mother–child contact) Arm C: Complicated delivery (infants placed in observation nursery after birth) and home visitation	Presumably all eligible Randomized (Arms A and B compared with uncomplicated delivery controls; Arm C compared with complicated delivery controls) Uncomplicated delivery: I (Arm A): n=47 I (Arm B): n=53 C: n=52 Complicated delivery: I (Arm C): n=60 C: n=59	Reports of abuse and neglect, through child's 1st birthday Uncomplicated delivery: Arm A: 4 Arm B: 7 Control group: 3 Complicated delivery: Arm C: 3 Control group: 3	Arm A: +47.5% (NS) Arm B: +128.9% (NS) Arm C: −1.7% (NS)
Velasquez (1984)[23] Highest: prospective with comparison Fair	Minnesota Study period not reported Age: 16 to 25 years; ethnicity not reported; majority unmarried; screened as "at risk" for child abuse	Visits one/wk; duration at least 18 mo, initiated after birth Nurses, social workers	Intensive health care services	Convenience sample Not random I: n=23 C: n=32	Number of infants who experienced one or more occurrences of abuse, neglect, or out-of-home placement, through 18 mo (proportion of sample) Intervention group: 2 (9%) Control group: 13 (41%)	−78.0% (p<0.01)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
Wagner (1999)[24] Highest: prospective with comparison Fair	California Probably 1991–1994 All teenagers aged <19 yr about 1/3 receiving AFDC; >50% Hispanic	Visits one/mo; duration 2 yr, initiated before birth or after birth in the first 6 mo of life Paraprofessionals	Arm A: Home visitation and parent support group Arm B: Home visitation, case management, and parent support group	Convenience Randomized (both arms compared with the same controls [no treatment]) I (Arm A): n=149 I (Arm B): n=138 C: n=163	Cases of abuse and neglect (at 2 yr), proportion of sample Arm A: 1.3% Arm B: 0% Control: 2.4%	Arm A: −45% (NS) Arm B: −100% (p<0.05)
Wagner (1999)[24] Highest: prospective with comparison Fair	California 1992–1996 >75% Hispanic: about 20% receiving AFDC	Visits one/mo; duration 3 yr, initiated after birth in first 6 mo of life Paraprofessionals	Parent support group available	Convenience Randomized I: n=210 C: n=153	Treated for injury during past year (assessed at age 3), proportion of sample Intervention group: 8.1% Control group: 11.9%	−31.9% (NS)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
Violence by parents						
Olds (1997)[21] Highest: prospective with comparison Good	Elmira NY Recruitment 1978–1980 88% white; 11% black; 62% unmarried; 59% low SES; 48% aged <19 yr	Visits one/wk, then less frequently, initiated before 29th wk of gestation through child's 2nd birthday Nurses	Both intervention and control groups received free transportation to prenatal and well-child care and developmental screening	All eligible Randomized Total sample: I: n=97 C: n=148 Subsample including only unmarried, low-SES mothers: I: n=38 C: n=62	(All outcomes relate to children's mothers, assessed 15 yr after intervention started) Incidence of arrests (state records) Total sample: Intervention group: 0.12 Control group: 0.38 (NS) Low SES unmarried: Intervention group: 0.16 Control group: 0.90 (p<0.01) Incidence of arrests (self-report) Total sample: Intervention group: 0.09 Control group: 0.22 (NS) Low SES unmarried: Intervention group: 0.18 Control group: 0.58 (p<0.01) Incidence of convictions (state records) Total sample: Intervention group: 0.12 Control group: 0.27 (NS)	Arrests (state records) Total sample: −68.4% (NS) Low SES, unmarried: −82.2% ($p < 0.01$) Arrests (self-report) Total sample: −59.1% (NS) Low SES, unmarried: −69.0% (p<0.01) Convictions (state records) Total sample: −55.6% (NS) Low SES unmarried: −81.8% ($p < 0.01$) Convictions (self-report) Total sample: −76.9% (NS) Low SES, unmarried: −78.4% ($p < 0.01$)

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Table A1. *(continued)*

Author & year Design suitability: design Quality of execution	Location Study period Population	Intervention Frequency and duration Visitor type	Intervention Other components (study arms, if any)	Sample selection Assignment to treatment conditions Sample size (at assessment)	Effect measure Effect reported in study	Value used in summary, relative percent change (significance level)
					Low SES unmarried: Intervention group: 0.13 Control group: 0.69 ($p<0.01$) Incidence of convictions (self-report): Total sample: Intervention group: 0.03 Control group: 0.13 (NS) Low SES unmarried: Intervention group: 0.06 Control group: 0.28 ($p<0.01$)	
Intimate partner violence						
Eckenrode (2000)[25] Highest: prospective with comparison Good	Elmira, New York Recruitment 1978–1980 88% white, 11% black; 62% unmarried; 59% low SES; 48% aged <19 years	Visits 1/wk, then less frequently, initiated before 29th wk of gestation, through child's 2nd birthday Nurses	Both intervention and control groups received free transportation to prenatal and well-child care and developmental screening	All eligible Randomized Total sample: I: $n=97$ C: $n=148$	Incidence of domestic violence over the 15-year follow-up period No significant difference between intervention and control groups	No significant difference, no value specified

AFDC, Aid to Families with Dependent Children; C, comparison; I, intervention; mo, month(s); *n*, sample size; NS, not significant; SES, socioeconomic status; wk, week(s); yr, year(s).

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